

**Benefits of education for individuals and society:
Improving equity**

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**QSA Senior Schooling Conference
High Quality - High Equity:
Getting the balance right**

Brisbane, 10 March 2008

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ABN 34 117 491 228

This PowerPoint was used in a presentation on 10 March 2008 to a Queensland Studies Authority Senior Schooling Conference, *High Quality - High Equity: Getting the Balance Right*.

Professor Barry McGaw is half-time Director of the Melbourne Education Research Institute at the University of Melbourne and works half-time as a consultant through McGaw Group Pty Ltd. He has recently been appointed as Chair of the new National Curriculum Board.

He returned to Australia at the end of 2005 from Paris where he had been Director for Education at the Organisation for Economic Co-operation and Development (OECD). He had previously been Executive Director of the Australian Council for Educational Research (ACER) from 1985 to 1998 and Professor of Education at Murdoch University in Perth Western Australia from 1976 to 1984. He was originally a science teacher in Queensland and was head of the Research and Curriculum Branch in the Queensland Department of Education before moving to the Chair at Murdoch University.

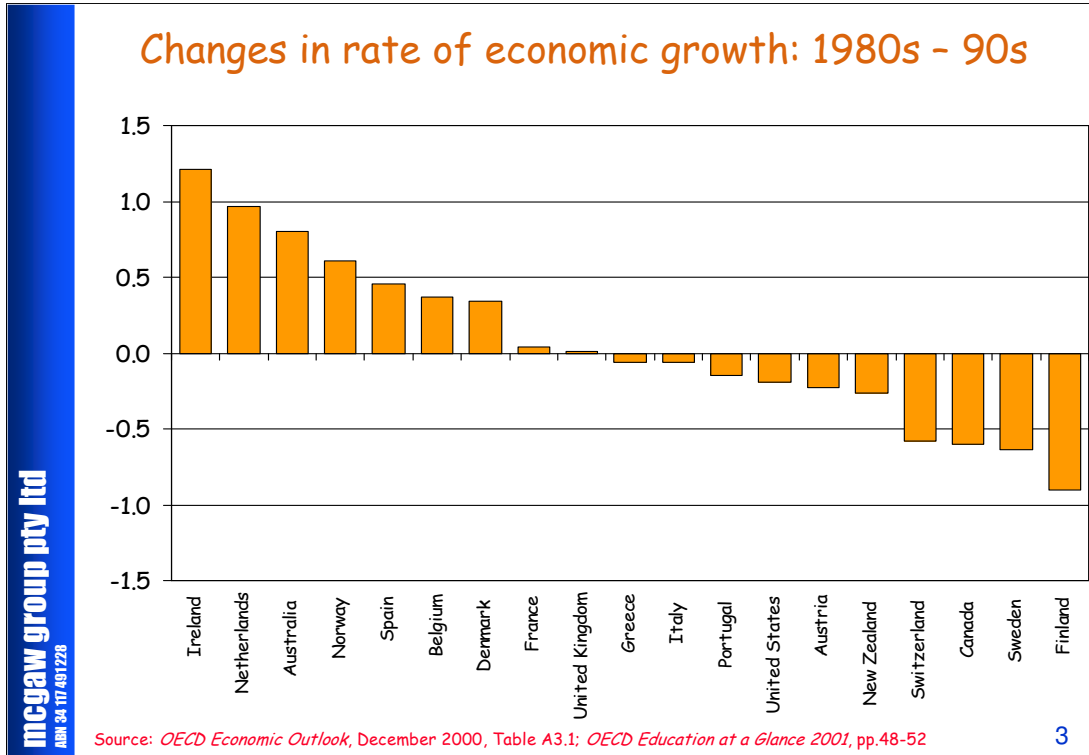
Professor McGaw completed a PhD in educational psychology and psychometrics at the University of Illinois and a BSc in chemistry, psychology and statistics and a BEd Hons in educational psychology at the University of Queensland.

He is a Fellow of the Academy of the Social Sciences in Australia, the Australian Psychological Society, the Australian College of Educators and the International Academy of Education. He has been President of the Australian Association for Research in Education, the Australian College of Educators, the Australian Psychological Society and the International Association for Educational Assessment.

Professor McGaw received an Australian Centenary Medal in 2003 and was appointed an Officer in the Order of Australia in 2004. He has been honoured by the University of Illinois with a College of Education Distinguished Alumni Award in 2000 and with the university's International Alumni Award for Exceptional Achievement for 2005.



I turn first to evidence on the benefits of education to countries.



There were marked differences among OECD countries in changes in growth rates from the 1980s to the 1990s, as shown in the figure above. Some countries (e.g. Ireland, Netherlands, Australia) grew faster in the 1990s than in the 1980s while others (e.g. Finland, Sweden, Canada, New Zealand) grew more slowly. The growth rates in the UK were essentially unchanged between the two periods.

In order to understand better the drivers of economic growth, the OECD Growth Study investigated the sources of these differences.

Factors influencing economic growth

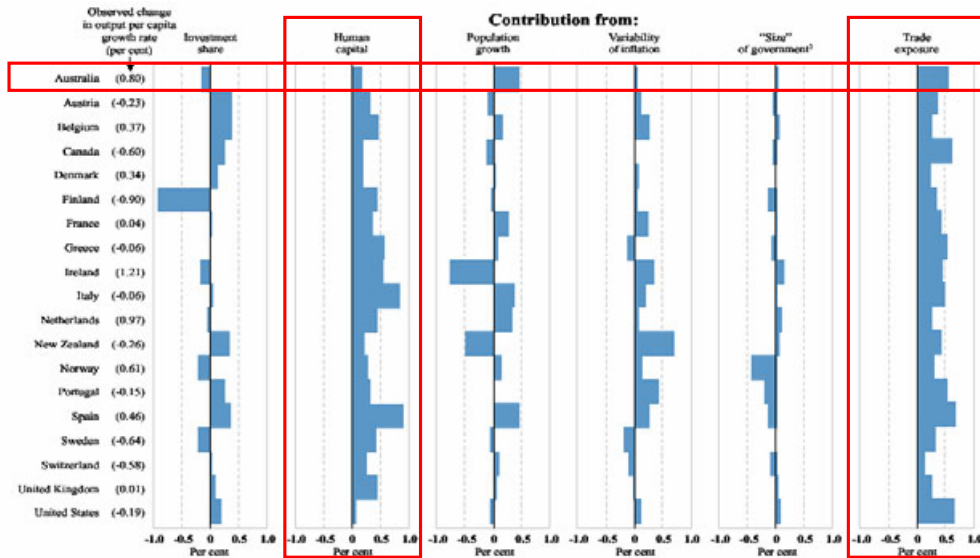
- Business investment rate
- Human capital (measured as 'educational attainment')
- Population growth
- Variability of inflation
- Size of government
- Trade liberalisation

For countries, evidence of the benefit of higher levels of education in the population is provided by the OECD Growth Study which examined the differences among OECD Member countries in changes in growth rates between the mid-1980s and the mid-1990s.

The influences of six factors were investigated:

- business investment rate,
- human capital (measured as number of years completed not by quality),
- population growth,
- variability of inflation,
- size of government,
- trade liberalisation.

Contributions to economic growth: 1990-98



The model fitted in the Growth Study assumed that the nature of the impact of a factor was the same in each country, with differences in impact reflecting differences in the changes in the factor. The appropriateness of this assumption was evaluated and confirmed.

Only two factors had a significant impact on changes in growth rates across all countries investigated:

- Human capital
- Trade exposure.

The variations in the impact of human capital across the countries, shown in the figure above, reflect variations in the growth in human capital. The countries that gained the most benefit from increased human capital were those that achieved the greatest increases in human capital in the period.

Pay-off for countries

- One additional year of education
 - 3-6% increase in GDP [*Education at a Glance* (EAG) 2006, pp.156-157]
 - 1% increase in rate of growth [EAG 2006, pp.156-157]
- Higher literacy levels
 - Average adult literacy scores 1% above international average, then labour productivity 2.5% and GDP 1.5% above average [EAG 2006, pp.155]

Having investigated the relationship between the stock of education (human capital measured by number of years of education) and

- the long-run level of GDP
- the rate of growth of GDP,

the OECD concluded that an increase of one year in the average level of education of the working-age population raises GDP by 3 to 6% and increases the growth rate by around 1%. There is some evidence that the pay-off diminishes as the average level of education rises above levels that many OECD countries now exceed.

When measured levels of literacy are used as the indicator of the quality of human capital instead of years of education as an indicator of quantity, similar relationships are found. Coulomb et al. report that a country able to attain literacy scores 1% higher than the international average will achieve levels of labour productivity and GDP per capita that are 2.5 and 1.5% higher, respectively, than those of other countries. [This work is cited in *Education at a Glance 2006* as indicated in the slide above.]

The storyline so far...

There are substantial national benefits in more and better education.



I turn now to evidence on the benefits of education to individuals.

Pay-off for individuals

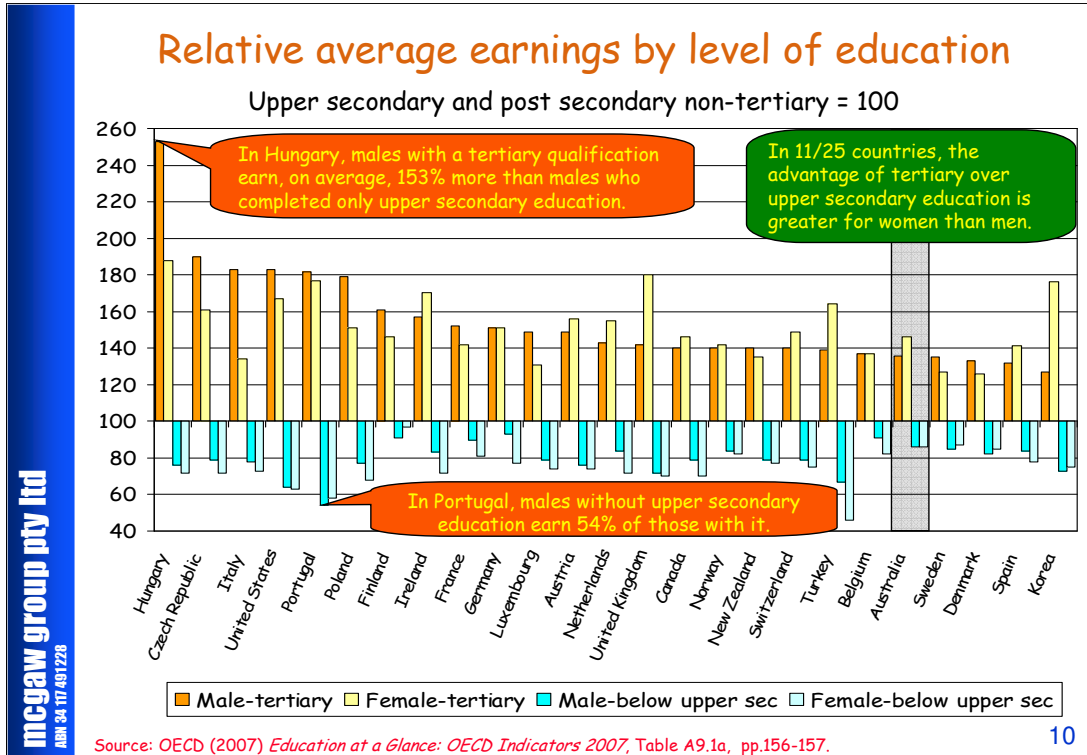
- Those with higher levels of education have
 - Higher employment rates [Education at a Glance (EAG) 2007, Table A8.1a]
 - Lower unemployment rates [EAG 2007, Table A8.2a]
 - Higher average earnings [EAG 2007, Table A9.1a]
 - High internal rate of return [EAG 2007, Table A9.2a, A9.3]
- These benefits have not diminished over time
 - Despite increases in education levels [EAG 2007, Tables A8.3a, A8.4a, A9.3]

International comparative analyses undertaken by the Organisation for Economic Co-operation and Development (OECD) make clear the extent to which higher levels of education pay off for individuals. These are documented regularly in the annual OECD publication *Education at a Glance*, the most recent being in the tables indicated in the slide from *Education at a Glance 2007*.

The benefits for individuals lie in:

- higher employment rates,
- lower unemployment rates,
- higher average earnings (on which more is said in slide 10)
- high internal rates of return (on which more is said in slides 11 and 12).

Furthermore, now that OECD has accumulated data going back over more than a decade, it can be said that, at least over that period, the benefits have not decreased despite more people reaching higher levels of education.



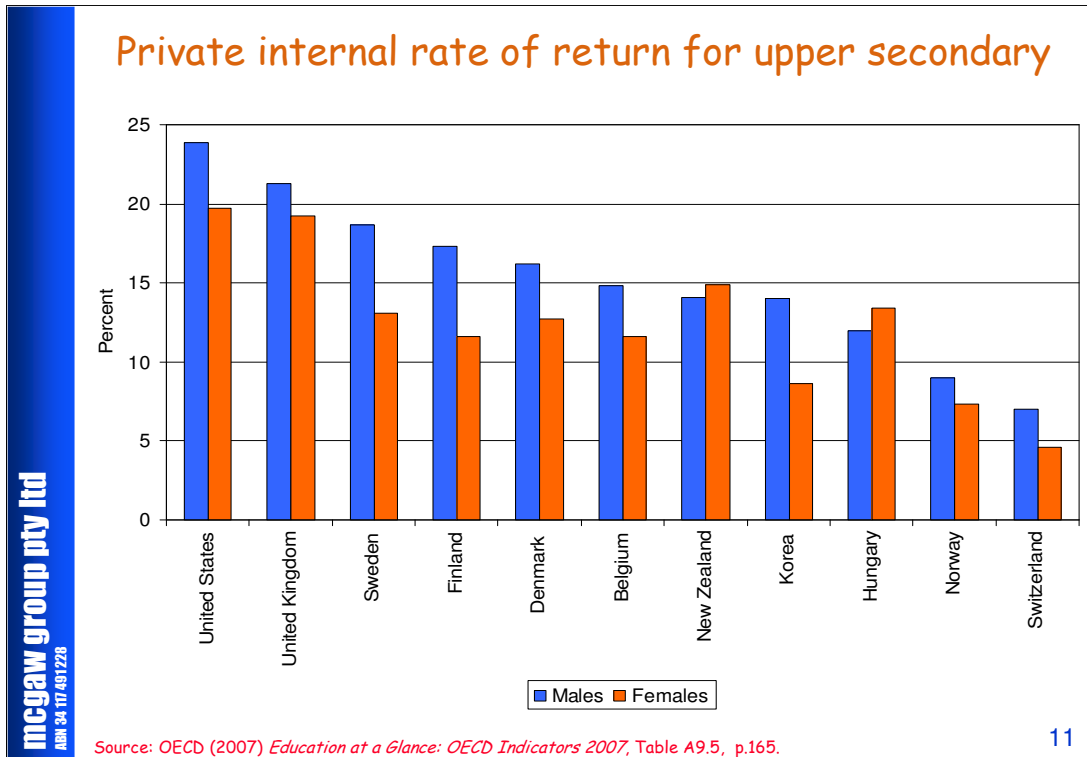
Simple, direct evidence on the economic benefit for individuals of completing a higher level of education is provided by comparisons, for males and females, of the salary benefit associated with higher levels of education. The comparisons in the figure above show:

- The ratio of the mean annual earnings of tertiary graduates to the mean annual earnings of upper secondary and post-secondary, non-tertiary graduates, with the latter indexed to 100.
- The ratio of the mean annual earnings of upper secondary and post-secondary, non-tertiary graduates to the mean annual earnings of those with lower levels of education, with the former indexed to 100.

In all 25 countries, tertiary graduates earn more than those whose formal education ends at upper secondary level or post-secondary, non-tertiary level. The premium for males ranges from 27% in the Republic of South Korea (index 127) to 153% in Hungary (index 253). In 11 countries the premium for females is higher than for males. These higher premiums do not mean women graduates earn more than men; only that the advantage for women with a tertiary qualification over women with only upper secondary education is greater than that for men with a tertiary qualification over men with only upper secondary education. The Australian figures are 36% for males and 46% for females.

Those who leave before completing upper secondary education are at a disadvantage in economic terms. In the United States, for example, males earn on average only 64% of the average earnings of those who have completed upper secondary or post-secondary, non-tertiary education and females 63%. The Australian figures are 86% for both males and females.

Variations in relative earnings between countries reflect skill demands in the labour force; minimum wage legislation; strength of unions; coverage of collective bargaining agreements; supply of workers at the various levels of educational attainment; and relative incidence of part-time and part-year work.



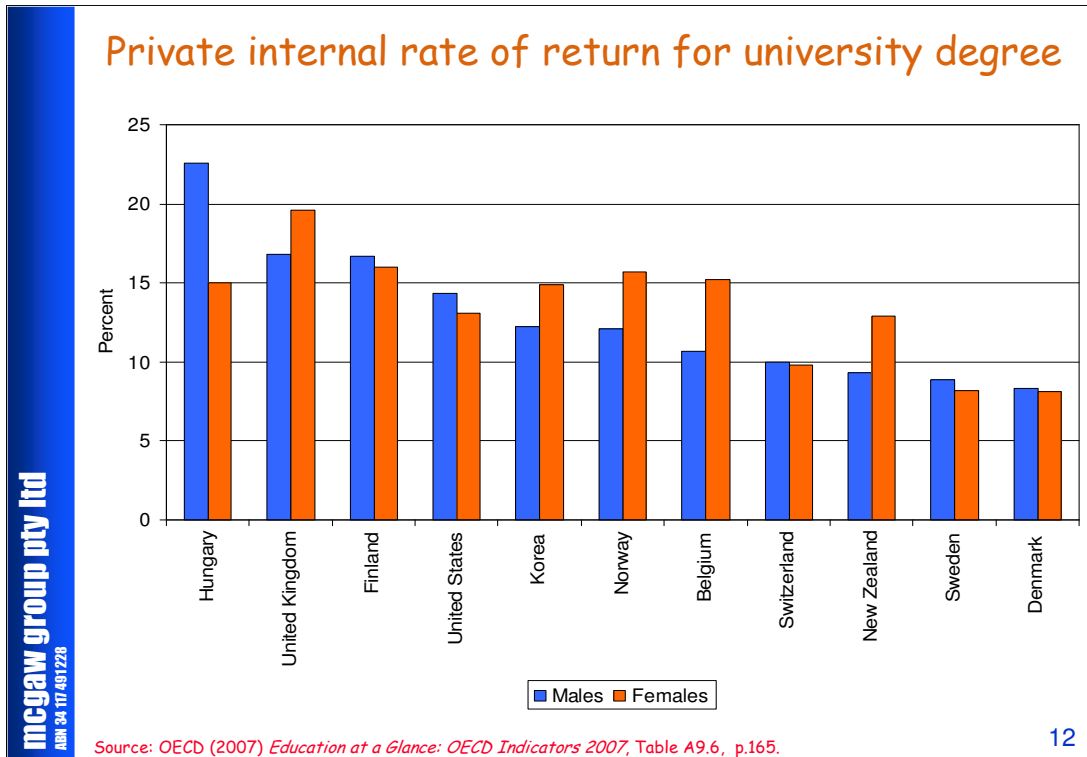
A more thorough way in which to examine the benefits of additional education is to consider both the costs and the benefits. These include:

- Costs:
 - Tuition fees paid in obtaining additional education
 - Higher tax paid by those with additional education on higher earnings
- Benefits
 - Public funding of the costs of obtaining additional education
 - Higher pre-tax earnings, though over a shorter working life because of time spent in study
 - Reduced risk of unemployment for those with additional education.

The net benefit can be expressed as an internal rate of return. Among the 11 countries for which the data are available, the highest rate of return to upper secondary education occurs in the US for males (23.9%) showing how much better it is for males there to complete upper secondary education. The UK is not far behind.

These are, of course, only average returns. They would not be achieved by all individuals because of:

- differences in their courses of study,
- differences in the employment choices and opportunities among individuals,
- differences among the individuals in other characteristics that influence remuneration.



The highest internal rate of return to tertiary education occurs in Hungary for males (22.6%) and in the United Kingdom for females (19.6%). The lowest rates are in Denmark – 8.3% for males and 8.17% for females – where salary dispersal is relatively low and income tax rates are more progressive than in many other countries.

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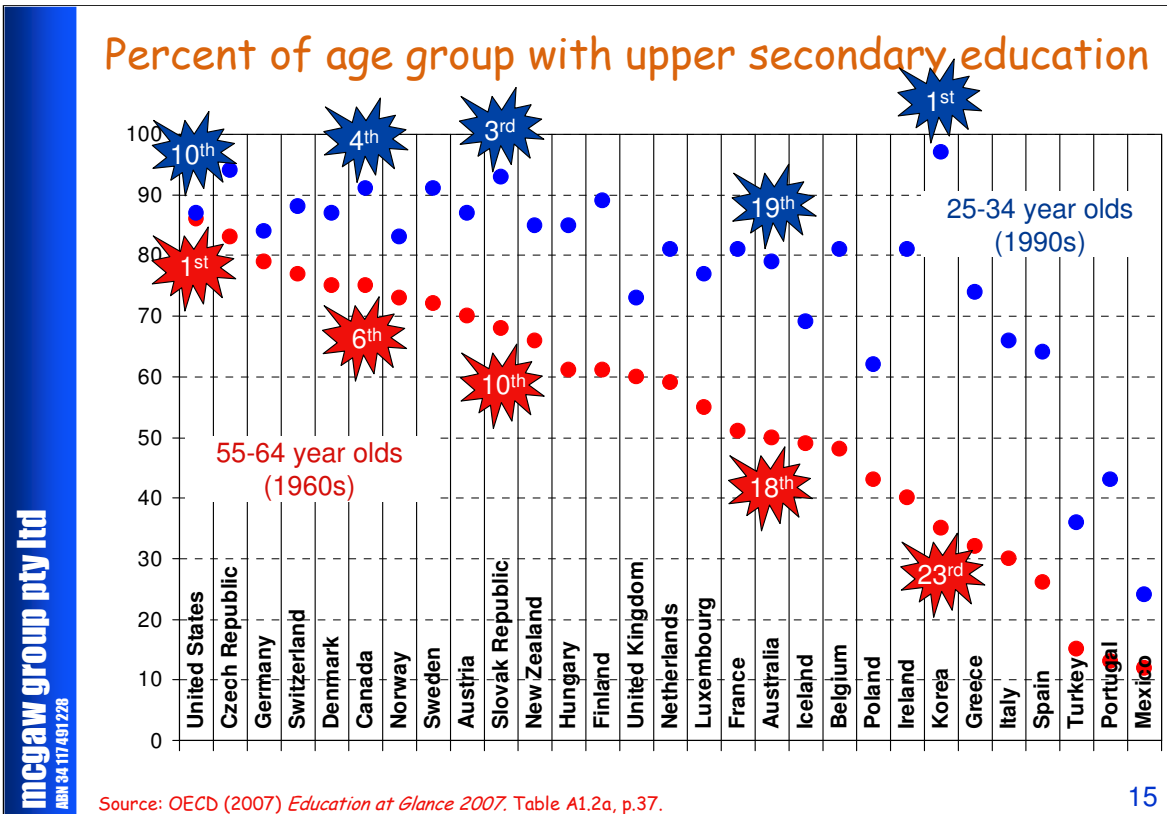
The storyline so far...

There are substantial national benefits in more and better education.

There are substantial individual benefits in completing more education.



Benefits accrue only if additional education is completed and, in that respect, many more Australians miss out than in other OECD countries. The rates at which Australians complete upper secondary education (or equivalent) and tertiary education are relatively low in comparison with other OECD countries.



Source: OECD (2007) *Education at Glance 2007*, Table A1.2a, p.37.

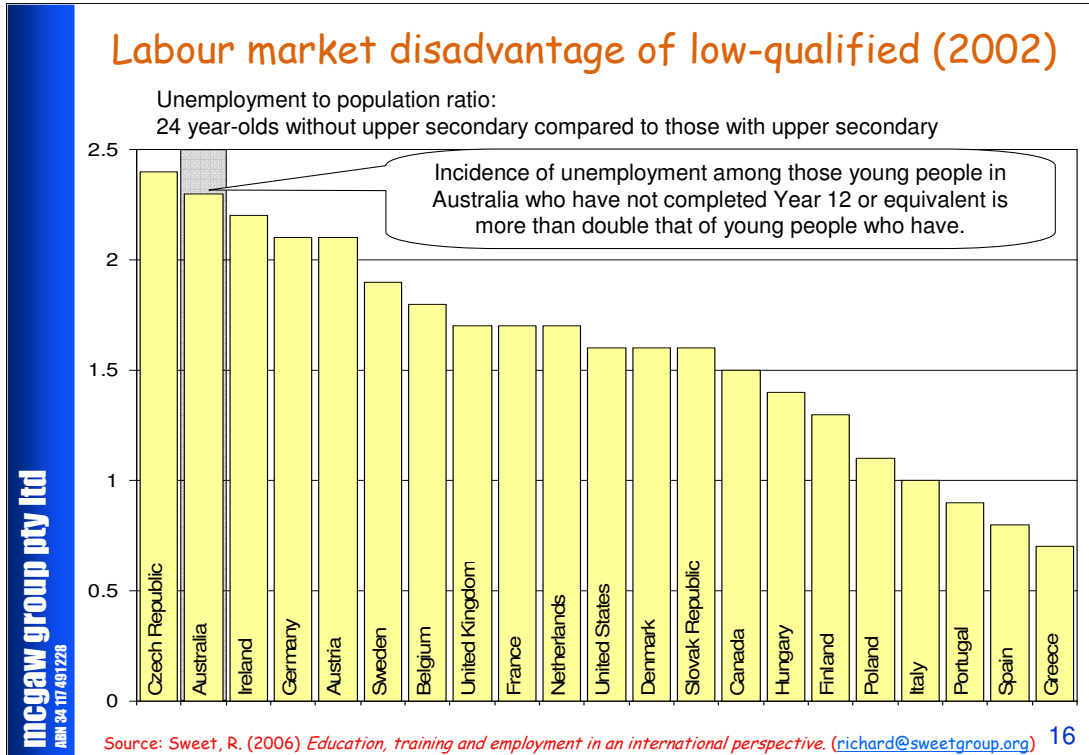
There are no internationally comparable data on trends in completion rates for upper secondary education or equivalent but a picture for past decades can be obtained from the percentages of the population in different age brackets that have attained this level.

The percentage of 55-64 year-olds who have attained upper secondary education indicates completion rates in the 1960s (around 37-46 years ago). The picture is only approximate because some will have attained this level as adults, long after having left initial education, and also because some of the population will not have survived to this age-group. Younger groups provide corresponding pictures for more recent decades.

The figure above shows the attainment rates for 55-64 year-olds and 25-34 year-olds. The rates for 25-34 year-olds reveal that, by the 1990s, 17 of the 30 OECD countries had achieved attainment rates of 80% or higher. Australia was not among them.

The Republic of South Korea started from a low base but grew quickly, rising from 23rd in the 1960s to 1st by the 1990s. Over the same period, Japan rose from 10th to 3rd. The US started from a high base but grew quite slowly, slipping from 1st to 10th. Australian rates have grown relatively slowly from a comparatively low base, with the rank slipping marginally from equal 18th to 19th. Meanwhile Canada rose from 6th to 4th.

In the mid-1960s, South Korea had a GDP per capita equivalent to that of Afghanistan and behind all the countries of Latin America. South Korea is now a Member of the OECD, with a GDP per capita that ranks it 23rd among the 30 OECD countries. Education reform and a deep national commitment to education and skill development are recognised as key drivers of this remarkable economic growth.



The negative impact of failing to complete upper secondary education or its equivalent is evident in the labour market consequences, as Richard Sweet recently documented in the graph above. In the Czech Republic, the unemployment rate for 24-year-olds who have not completed upper secondary education or its equivalent is 2.4 times the rate for those who have. In Australia, the ratio is 2.3. Sweet concludes:

“There is normally an inverse relationship between the incidence of low qualifications and the penalty that those with low qualifications suffer in the labour market. In countries where nearly all complete upper secondary education, the cost of being one of the handful not to do so is normally high. Where many do not complete high school, the labour market consequences are generally less. However Australia seems to have the worst of both worlds: both a relatively high number of young people without an upper secondary qualification or better, and these young people being at a significant disadvantage in the labour market. The result ... is that the penalty for not completing Year 12 or its equivalent is one of the highest in the OECD.” [Sweet, R., *Education, training and employment in an international perspective*, Paper presented at a Brotherhood of St Laurence Seminar, *New Transitions: Challenges Facing Australian Youth*, Melbourne, August 2006.]

The storyline so far...

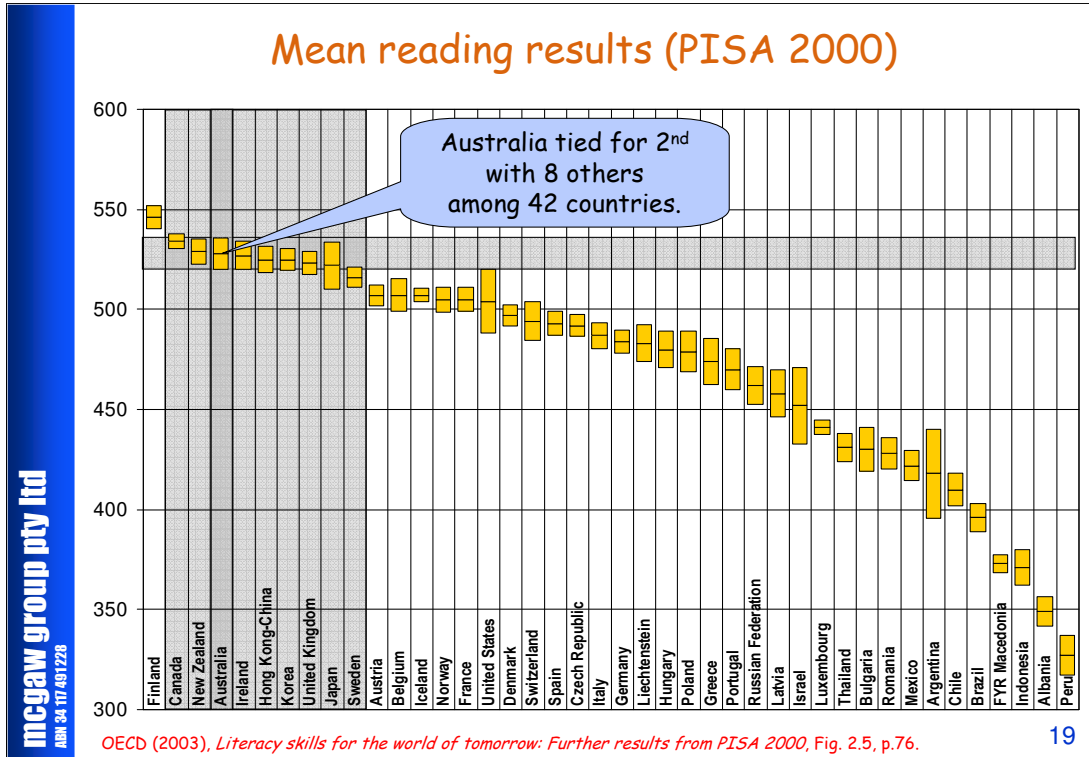
There are substantial national benefits in more and better education.

There are substantial individual benefits in completing more education.

Too many young Australians do not finish upper secondary education or its equivalent and the penalties are high.



International comparisons of student performance show that Australian school education is of relatively high quality, though there are some worrying trends emerging.



The figure above shows the mean performances of countries in reading literacy in PISA 2000. Reading literacy assessed in PISA is the capacity to use, interpret and reflect on written material.

The line in the middle of the box for each country gives the mean performance of 15-year-olds in the country. The size of a box reflects the precision with which a country's mean is estimated. Where the boxes overlap on the vertical dimension, there is no significant difference between the means for the countries. (Further details are given in the PISA report indicated at the foot of the figure.)

The results reveal marked variations in performance levels among the 42 participating countries – ranging from Finland, significantly better than all others at the top, to Peru, significantly worse than all others at the bottom.

Australia ranked in 4th place but its mean is not significantly different from those of two countries above it or six below it. It is, therefore, appropriate to say that Australia ranked between 2nd and 10th or that Australia tied in 2nd place with eight other countries among the 42 participating.

Australia's ranking in OECD/PISA Reading

□ Reading ranks

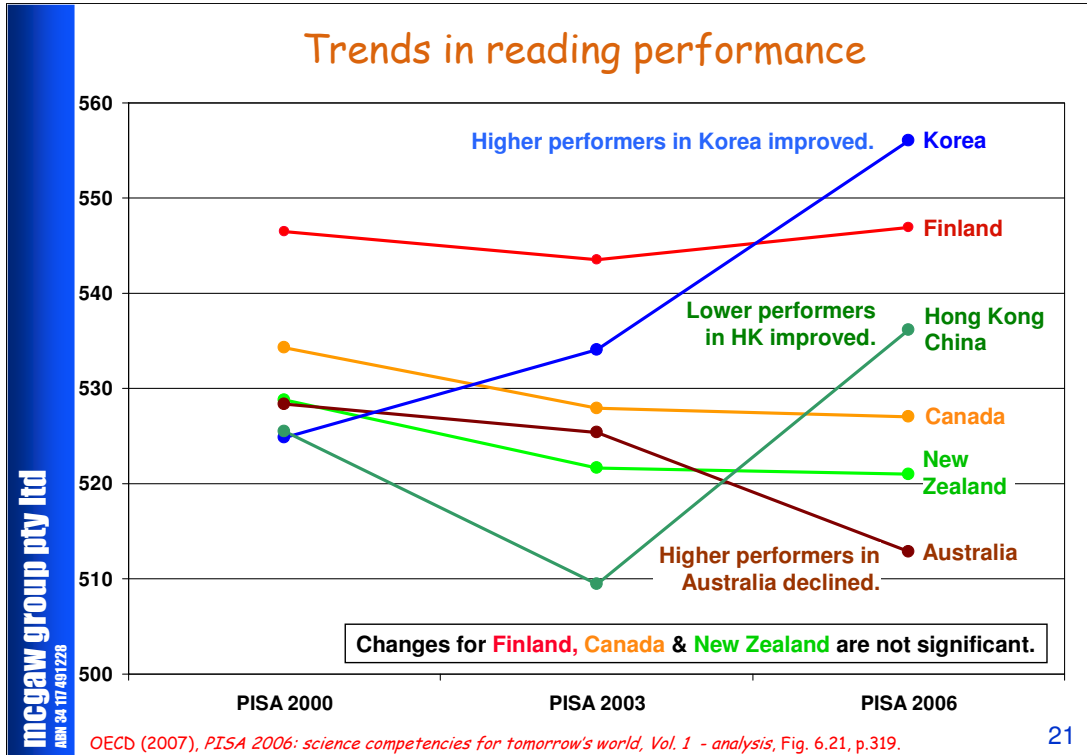
- PISA 2000: 4th but tied for 2nd
- PISA 2003: 4th but tied for 2nd
- PISA 2006: 7th but tied for 6th

	PISA 2000	PISA 2003	PISA 2006
Ahead of Australia	Finland	Finland	Finland Korea Canada NZ Hong Kong
Same as Australia	Korea Canada NZ Hong Kong	Korea Canada NZ	
Behind Australia		Hong Kong	

20

Australia's relative position in the three PISA assessments slipped from 2nd in 2000 and 2003 to 6th in 2006. The reason is that four countries that were at the same level as Australia, or even behind in the case of Hong Kong in 2003, were significantly ahead of Australia 2006.

PISA expresses results on the same scale on each occasion so, as shown in the next slide, it is possible to see how the changes in rank order relate to shifts in levels of performance.

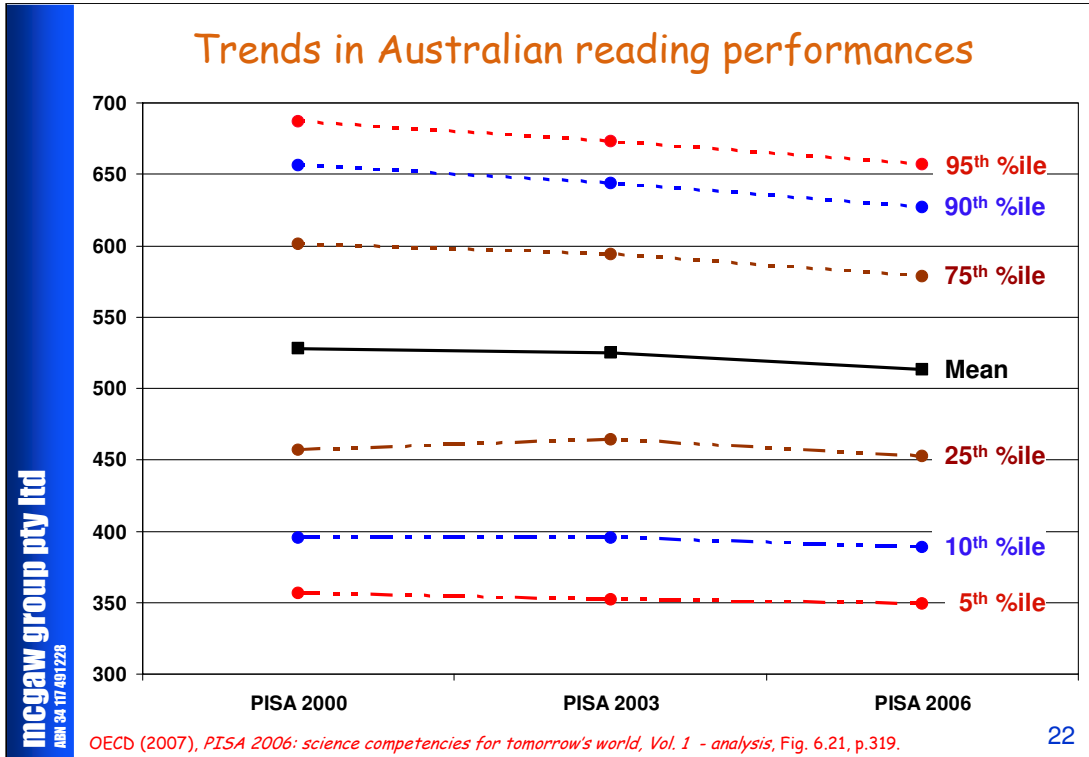


Australia's rank dropped because the Australian mean performance declined to 513 in 2006 from 528 in 2000 and 525 in 2003. This decline, which was statistically significant, occurred primarily because of a decline in performances at the highest level. The reasons for this are not immediately evident from the data but it is at least clear that it is due to schools focusing more on basic achievement levels and not so much on the development of sophisticated reading of complex text.

Korea, on the other hand, significantly improved its mean performance and did so by raising its performances at the highest levels. The sources of this improvement appear to be a new curriculum with more emphasis on essay tests and expanded use of essays in assessments for university entrance.

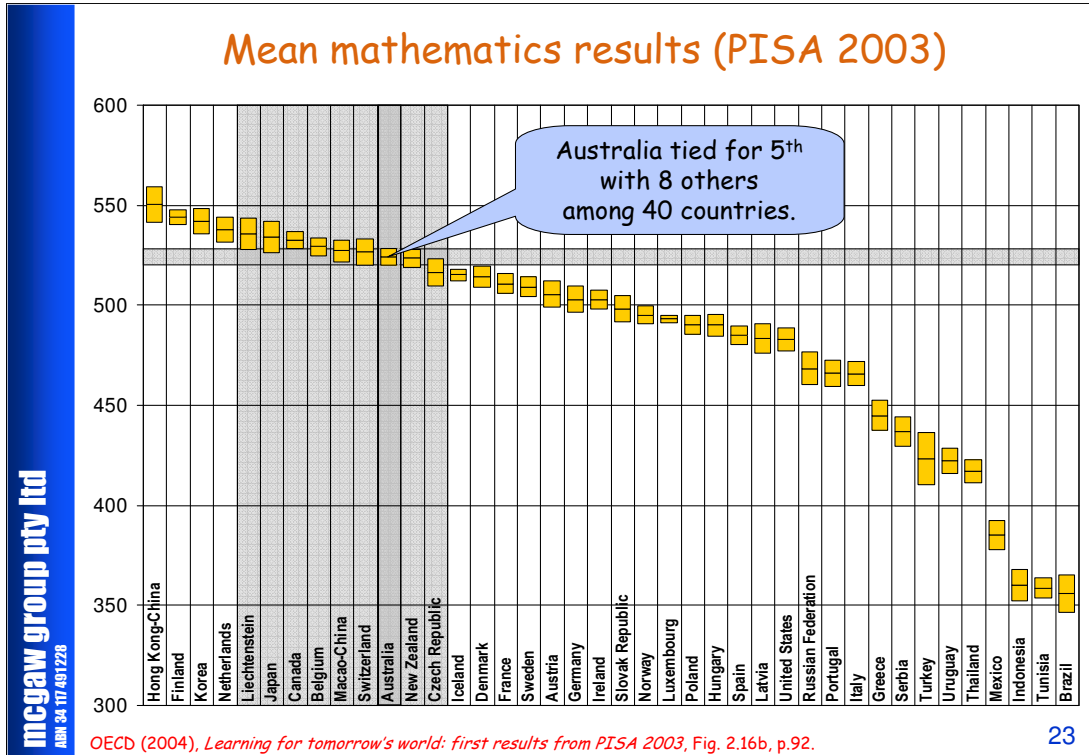
Hong Kong raised its mean performance by raising the performance of its poorer performing students and attributes this primarily to teacher development.

There were no significant changes for Finland, Canada and New Zealand.



The decline in Australia's mean performance is shown again the graph above together with the trends in performance levels of Australia's 15-year-olds at the 95th, 90th, 75th, 25th, 10th and 5th percentiles.

Performance levels at the lower percentiles did not drop, while those at the higher percentiles did. This shows that the significant drop in Australia's mean performance was due to a decline among high performers.



In PISA 2003, mathematics was the main domain of assessment. In this case, Australia ranked 11th overall out of the 40 participants but was not significantly different from six immediately above it or two immediately behind it. Australia, therefore, tied in 5th place with these eight other countries.

The countries significantly ahead of Australia were Hong Kong-China, Finland, Korea and the Netherlands.

PISA assesses whether 15-year-olds can use the mathematics they have learned in school. It does not focus primarily on the curriculum content to determine whether students have learned exactly what they were intended to learn. Instead, it assesses whether students can recognise that a problem can be solved mathematically, are able to 'mathematise' it (i.e. represent it mathematically) and then solve it.

Australia's ranking in OECD/PISA Mathematics

□ Mathematics ranks

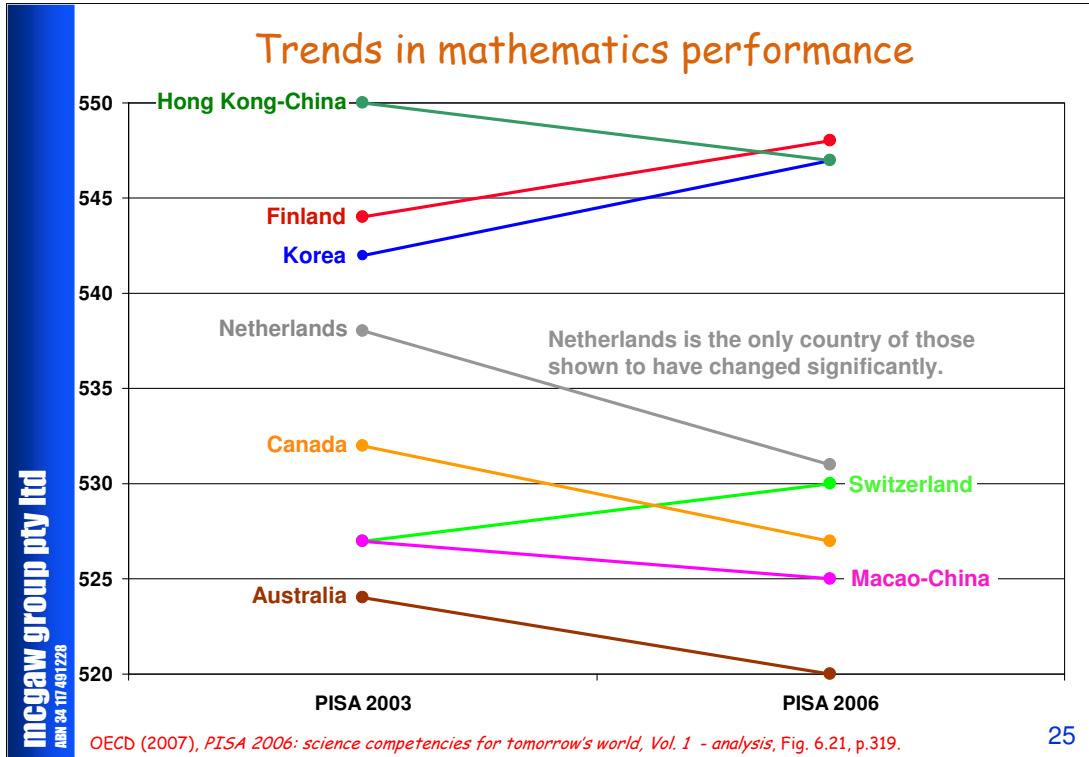
- PISA 2000: 6th but tied for 3rd
- PISA 2003: 11th but tied for 5th
- PISA 2006: 13th but tied for 9th

	PISA 2000	PISA 2003	PISA 2006
Ahead of Australia	Hong Kong	Finland Hong Kong Korea Netherlands	Taiwan Finland Hong Kong Korea Netherlands Switzerland Canada Macao
Same as Australia	Japan Finland Korea Switzerland Canada	Switzerland Canada Macao Japan	Japan

Australia's rank in PISA mathematics dropped from 3rd in 2000, to 5th in 2003 and 9th in 2006. Some of the shift is due to new countries joining – the Netherlands in 2003, performing significantly better than Australia on both occasions, Macao also in 2003 and performing at Australia's level in 2003 but significantly better in 2006 and Taiwan in 2006, performing significantly better than Australia.

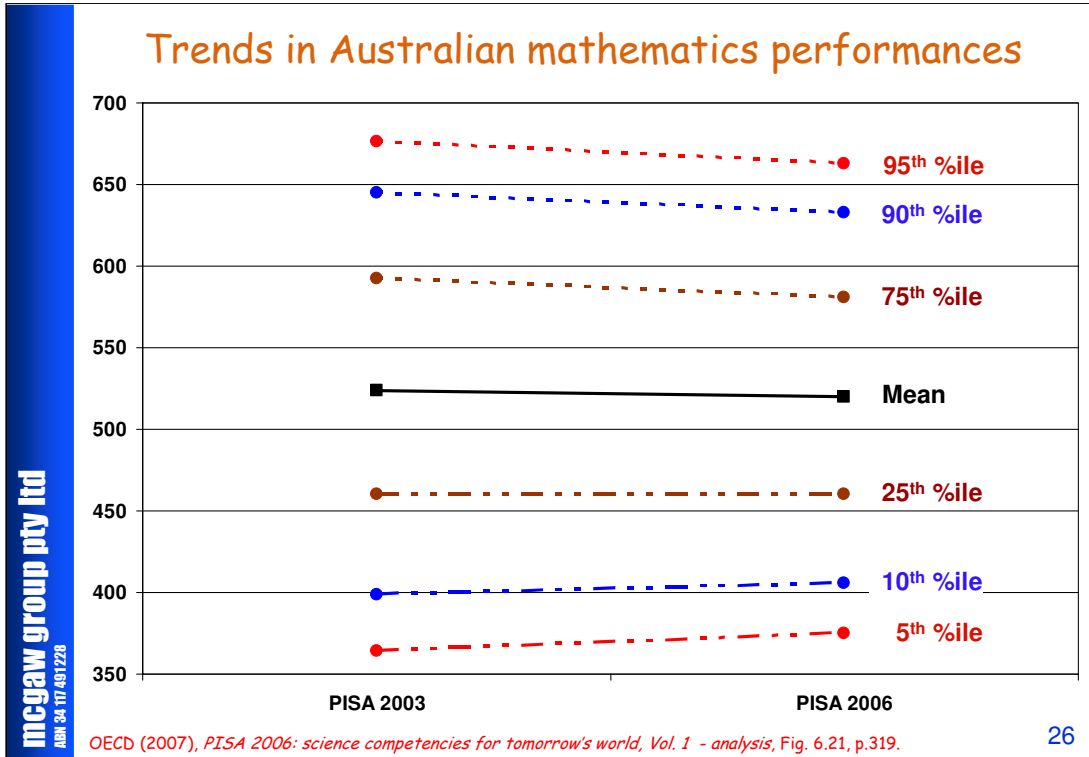
Some other countries which were equivalent to Australia in 2000 or 2003 were significantly ahead in 2006.

Only Japan among countries that were significantly better than Australia in the earlier PISA assessments has slipped back to equivalence with Australia.

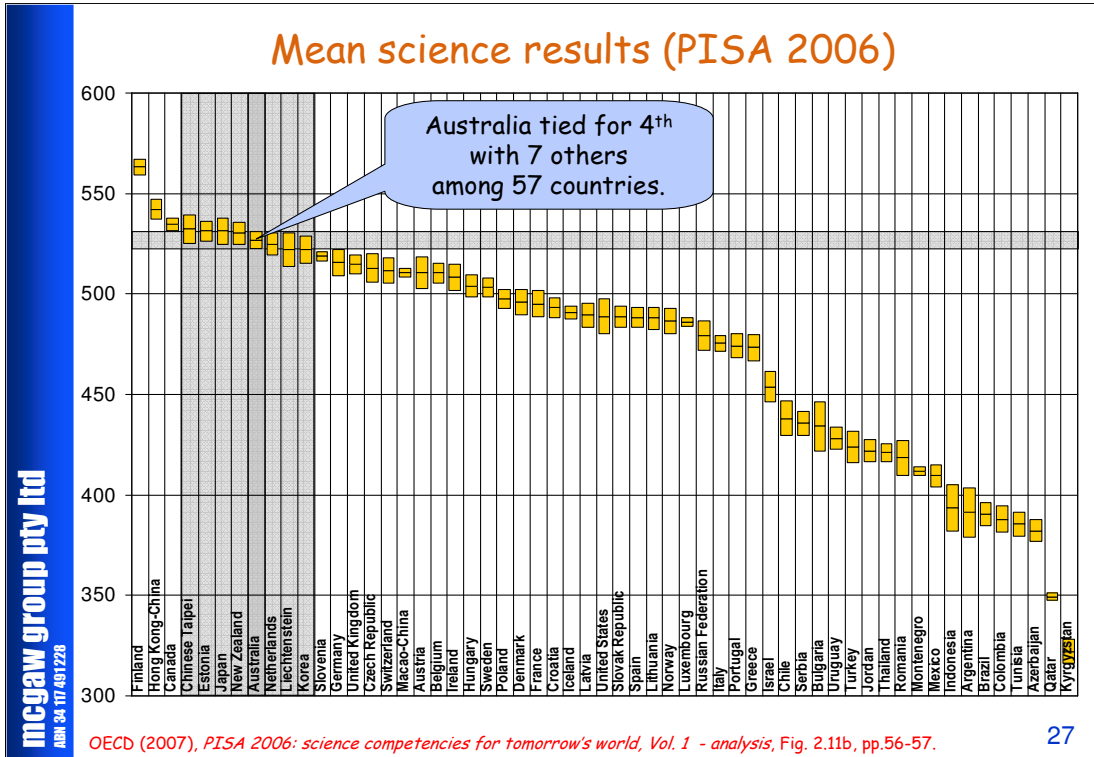


Australia's slip in ranking between 2003 and 2006 was not due to a significant decline in Australia's mean performance or to significant improvements in the results of other countries. Only the Netherlands, among the high performing countries shown in this slide and the previous one, shifted significantly and downwards.

The pattern of non-significant shifts among different countries, however, resulted in some countries shifting to positions that were in 2006 significantly ahead of Australia.



While Australia's 2006 mean was not significantly different from its 2003 mean, there was a decline in performance at the top end (as in reading literacy) but an offsetting improvement at the bottom end.



Science was the main domain of assessment in PISA 2006 and results are reported on a new scale that does not permit direct comparisons of absolute performance levels with those in previous PISA cycles. They do permit comparisons of relative positions.

Australia's ranking in OECD/PISA Science

□ Science ranks

- PISA 2000: 8th but tied for 3rd
- PISA 2003: 6th but tied for 4th
- PISA 2006: 8th but tied for 4th

	PISA 2000	PISA 2003	PISA 2006
Ahead of Australia	Japan Korea	Finland Japan Korea	Finland Hong Kong Canada
Same as Australia	Finland Hong Kong Canada	Hong Kong Canada	Japan Korea

Australia's ranks in science were high on all three occasions at 3rd in PISA 2000 and 4th in PISA 2003 and PISA 2006.

There is a relatively small number of countries that have outperformed Australia in science but none on all three occasions.

The storyline so far...

There are substantial national benefits in more and better education.

There are substantial individual benefits in completing more education.

Too many young Australians do not finish upper secondary education or its equivalent and the penalties are high.

The quality of education for Australian 15-year-olds

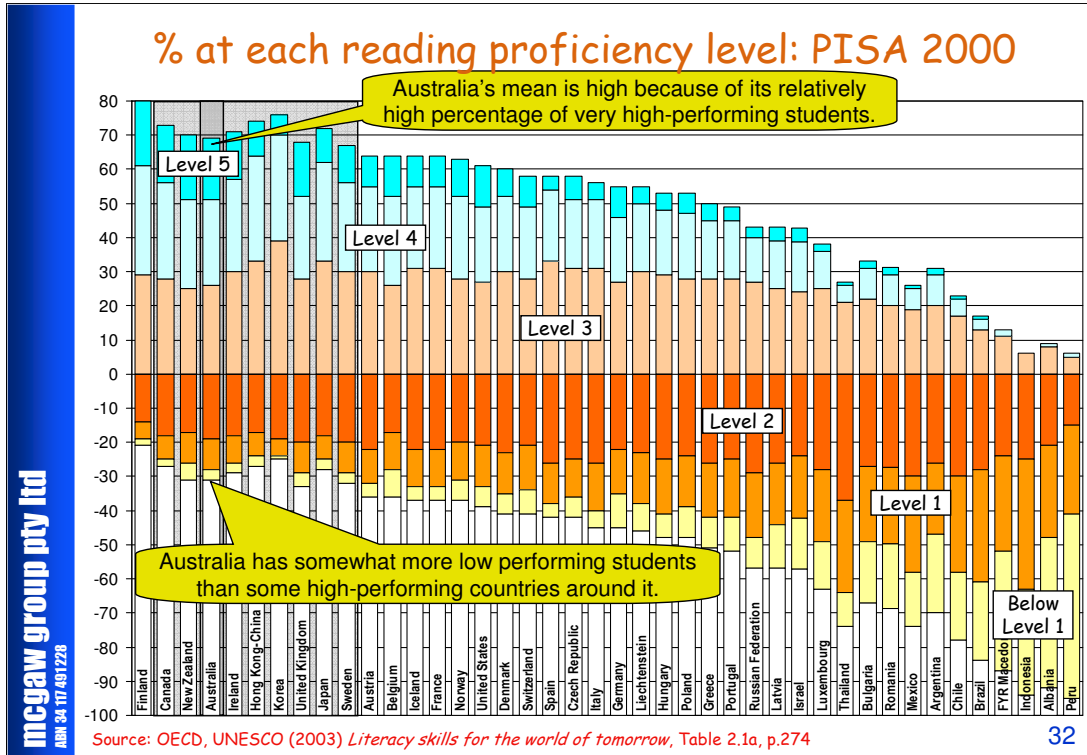
- Is among the best in the world, but we should want gold not silver
- The competition is not standing still



While Australian education is high quality there are some grounds for concern about equity.



One way in which to examine equity is to investigate whether poorer performing students are being left too far behind.



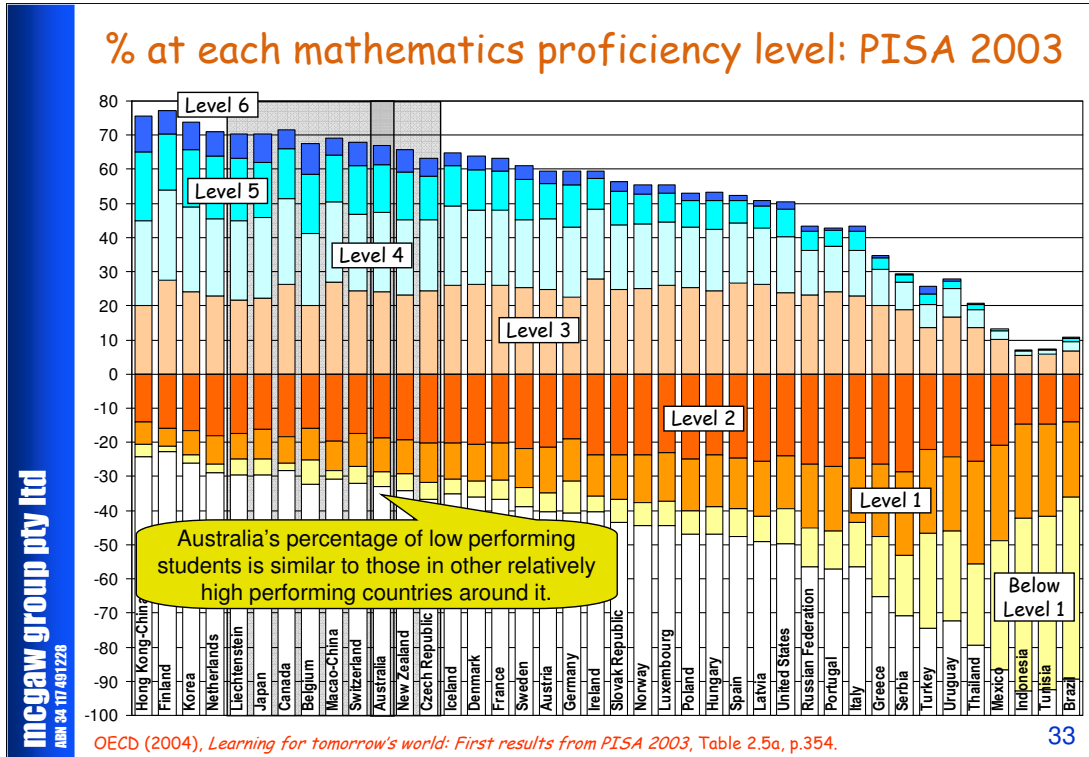
In the main domains of assessment in PISA, there is sufficient information to establish and describe well-defined levels of performance on the relevant scale. In PISA 2000, five levels of performance were defined on the reading scale, with an additional lower domain not well measured and described only as 'below Level 1'. Students at this level may be literate in the sense of being able to decode printed words and to read text but they do not have a level of literacy sufficient for further study and learning. Even those at Level 1 are highly likely to be deficient in this respect.

The figure above shows the percentage of students at each level in each country. Countries are arranged in order of their mean performance with those around Australia covered by the grey box being the ones with mean performances not significantly different from Australia's.

Australia stands out in two important respects from some of the other high-performing countries around it. Australia has a considerably higher proportion of students at the highest level (Level 5). It also has a rather larger percentage at Level 2 or below than some of the others. (New Zealand, Ireland, the United Kingdom and Sweden have similar patterns.)

There is, thus, a slightly higher proportion of poorer performers in reading in Australia than in some of the other countries that are similarly high performing on average.

Korea provides an interesting contrast. It has a considerably smaller proportion of high achievers but a correspondingly small proportion of very low achievers. In fact, Korea has the mostly narrowly dispersed student performances.



In PISA 2003, when mathematics was the main domain of assessment, six well-defined levels of performance were described. The figure above provides the distribution of students across these levels.

This figure shows that, in mathematics, the proportion of low achievers in Australia is in line with its overall mean. In mathematics, the proportion of poorer performers in Australia is, therefore, not greater than in other countries that are similarly high-performing on average.

The storyline so far...

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Too many young Australians do not finish upper secondary education or its equivalent and the penalties are high.

The quality of education for Australian 15-year-olds

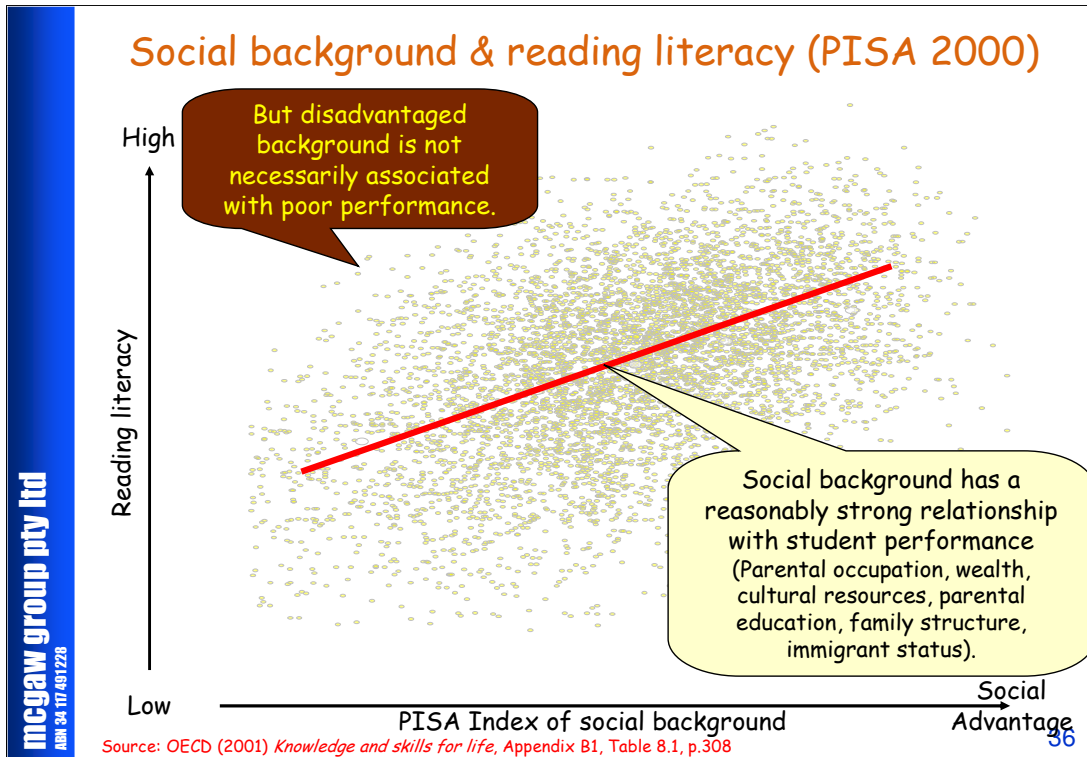
- Is among the best in the world, but we should want gold not silver
- The competition is not standing still

Differences between students in educational performance

- Are no greater for Australia than in other high performing countries



Another way in which to examine equity is to investigate the relationship between the performances and social backgrounds of students.



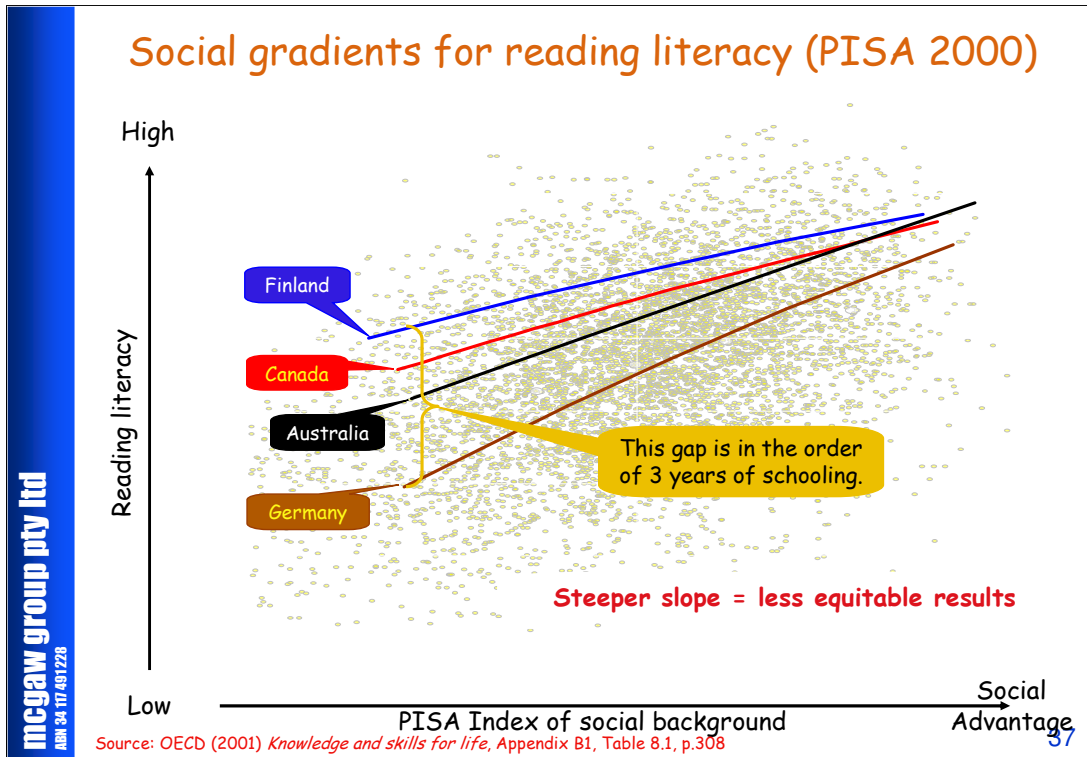
The 15-year-olds in PISA provide information on their economic and social background – parents’ education and occupation, cultural artefacts in the home – that permits the construction of an index of social background that ranges from socially disadvantaged to socially advantaged. This scale is comparable across countries.

The relationship between social background and reading literacy in PISA 2000 is shown in the figure above in which the results of the 265,000 15-year-olds in the sample on both variables are plotted. The correlation is relatively high (around 0.45) indicating quite a strong relationship between the two variables. The slope of the regression line that summarises the relationship is quite steep, indicating that increased social advantage, in general, pays off with considerable increase in educational performance.

It can, nevertheless, be seen that there are many exceptions – socially advantaged individuals who do not perform well (towards the bottom-right of the graph) and students from disadvantaged backgrounds who perform well (towards the top-left of the graph).

This result has been long established in research in many individual countries and it can lead to a counsel of despair. If the relationship between social background and educational achievement is so strong, education can seem to be impotent, unable to make a difference. There is other research evidence that provides assurance that schools can make a difference to the life chances of their students but the PISA also provide additional insights because it is possible to compare regressions lines of the type above for individual countries.

The slope of the regression line used in this fashion has been referred to as a ‘socioeconomic gradient’ or a ‘social gradient’.

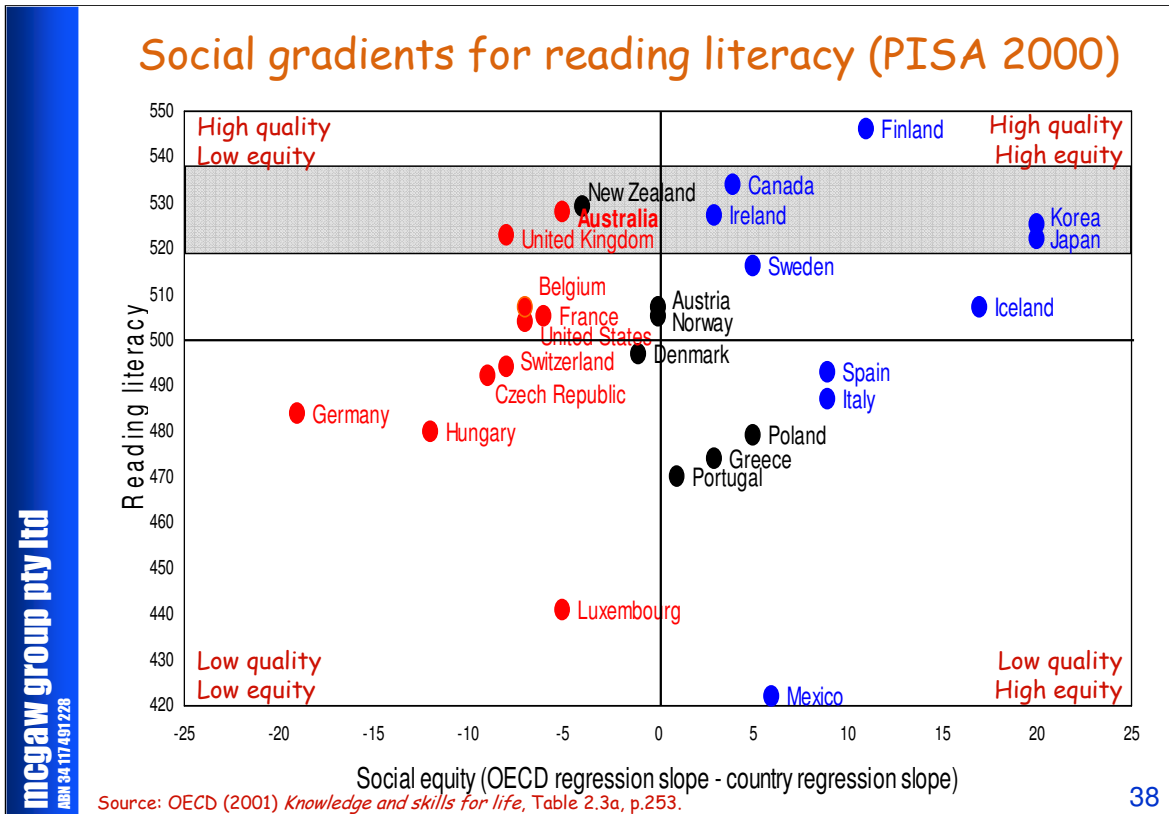


An examination of the relationship between social background and reading achievement country-by-country reveals marked differences among countries. The figure above shows the results for four countries. The lines for Finland and Canada are significantly less steep than the one for the OECD as a whole which was shown in the previous slide. Increased social advantage in these countries is associated with less increase in educational achievement than in the OECD as a whole. The results in these countries are more equitable than those of the OECD overall. Students differ in achievement but not in a way that is so substantially related to their social background.

The lines for Australia and Germany are both significantly steeper than the one for the OECD as a whole, as are those for the US and the UK which are not shown in the figure above. In all of these countries, social background is more substantially related to educational achievement than in the OECD as a whole. Their results are inequitable in the sense that differences among students in their literacy levels reflect to a marked extent differences in their social background.

The differences between these four lines at the left-hand end are substantial. Socially disadvantaged students do very much worse in some of these countries. The gap in educational achievement between similarly socially disadvantaged students in Germany and Finland represents around three years of schooling. Similarly disadvantaged students in Australia fall about half-way between, around 1½ behind their counterparts in Finland.

More detailed analysis of the German data shows the pattern to be strongly related to the organisation of schooling. From age 11, students are separated into vocational and academic schools of various types on the basis of the educational future judged to be most appropriate for them. Students from socially disadvantaged backgrounds generally end up in low-status vocational school and achieve poor educational results. Students from socially advantaged backgrounds are directed to high-status academic schools where they achieve high-quality results. The schooling system largely reproduces the existing social arrangements, conferring privilege where it already exists and denying it where it does not.



If lines for more countries were to be added to the figure on the previous slide, the pattern would become difficult to discern. The figure above provides a clearer picture for all OECD countries.

Mean performances of countries in reading literacy are represented on the vertical axis. The grey band highlights the countries with means not significantly different from Australia's.

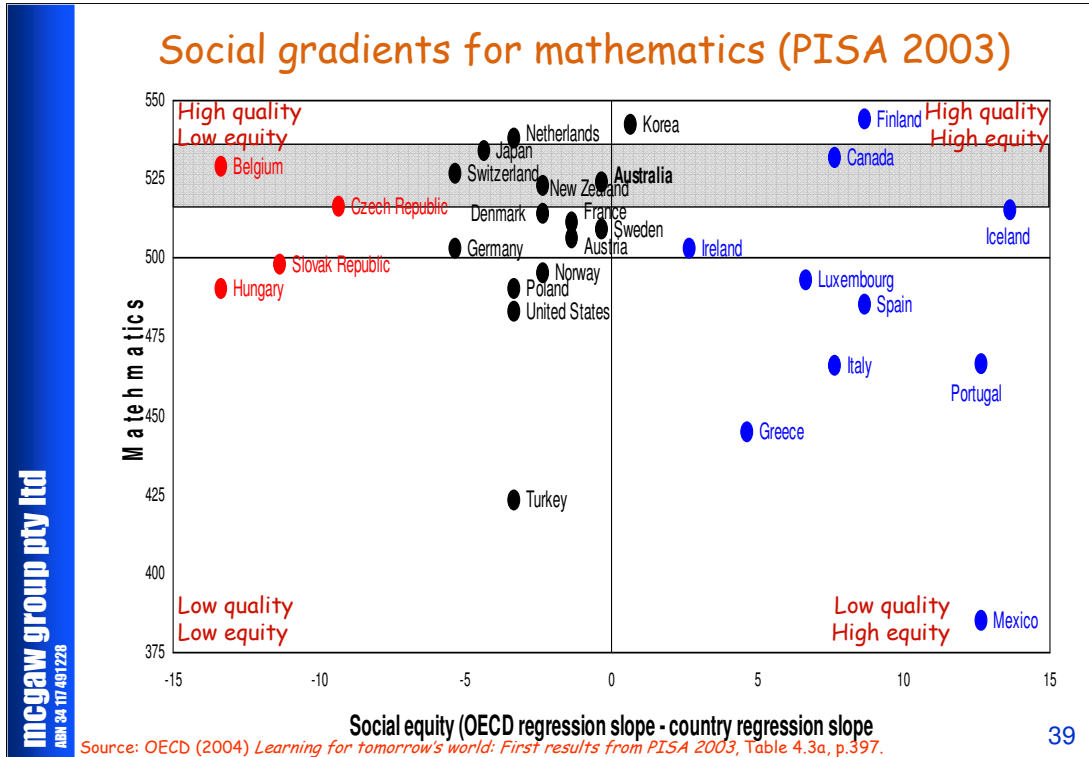
The slope of the regression line for social equity on reading literacy is represented on the horizontal axis as the difference between the slope for the OECD as a whole and a country's own slope. This places to the left countries where the slope is steeper than in the OECD as a whole (that is, countries in which social background is more substantially related to educational achievement) and to the right countries where the slope is less steep than that for the OECD as a whole (that is, countries in which social background is less related to educational achievement). Countries with slopes significantly less steep than the OECD's are shown in blue; those with lines significantly steeper are shown in red and those with lines not significantly different in slope from the overall OECD line are shown in black.

Countries high on the page are high-quality and those to the far right are high-equity. The graph is divided into four quadrants on the basis of the OECD average on the two measures.

The presence of countries in the 'high-quality, high-equity' quadrant (top right) demonstrates that there is no necessary trade off between quality and equity. They show that it is possible to achieve both together. Korea, Japan, Finland and Canada are among them.

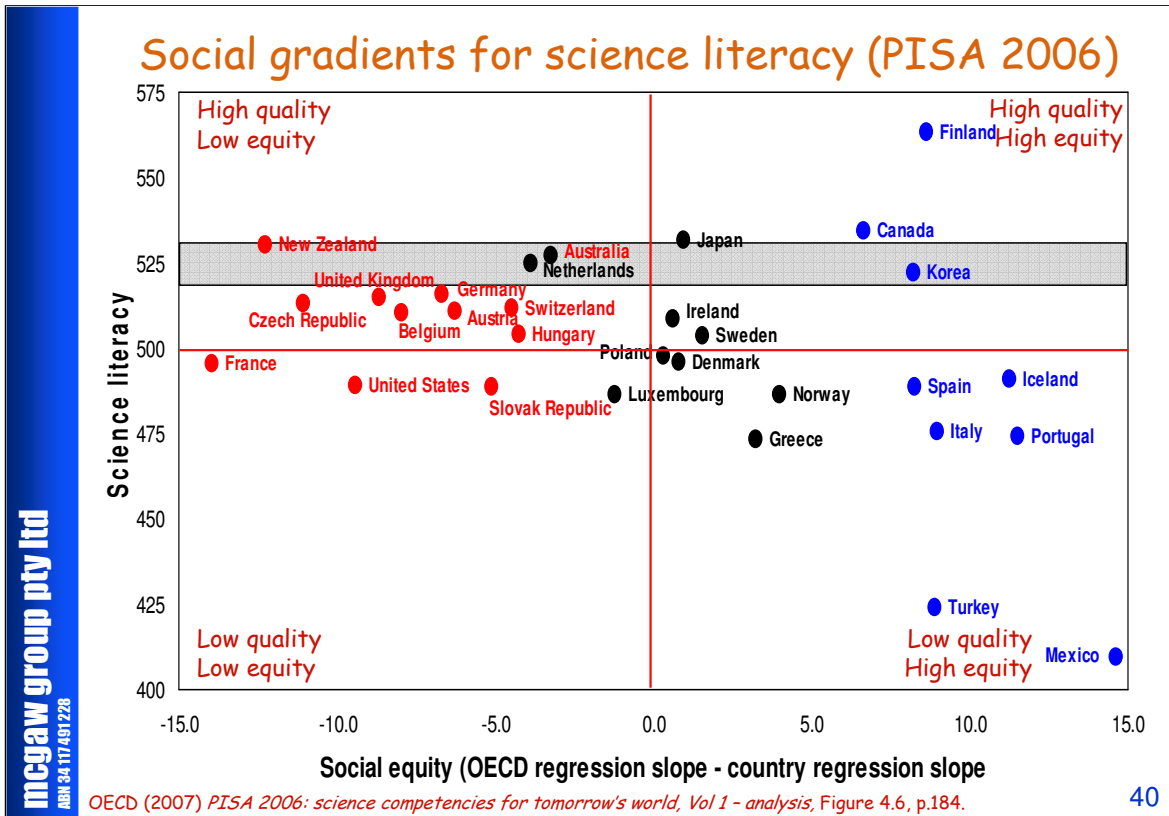
As already indicated in the previous slide, Australia is a 'high-quality, low-equity' country, with a high average performance but a relatively steep regression line. It is in the top-left quadrant along with the United Kingdom and New Zealand.

The United States is only average quality but it is low-equity. Germany, as a low-quality, low-equity country, is in the bottom-left quadrant along with a number of other countries that also begin to separate students into schools of different types as early as 11-12.



The figure above shows the relationship between the slope of countries' regression lines and their average performance in mathematics in PISA 2003. In this case, the line for Australia is not significantly different from the line for the OECD as a whole. While Australian mathematics performances are thus somewhat more equitable in mathematics than in reading, they remain much less equitable than the results in Canada and Finland.

There are many countries to the left of Australia in this graph (and thus with less equitable results) but the ones on which we should focus are those in the grey band containing countries equal to Australia in quality and those above that band. In particular, we should aspire to match Finland and Canada which again are high-quality and high-equity.



The figure above shows the relationship between the slope of countries' regression lines and their average performance in science in PISA 2006. In this case, the line for Australia is significantly steeper than the line for the OECD as a whole. Australian performances are again much less equitable than those in Canada and Finland and this time, as in reading in PISA 2000, also less equitable than those in Korea.

There are many countries to the left of Australia in this graph (and thus with less equitable results) but the ones on which we should focus are those in the grey band containing countries equal to Australia in quality and those above that band. In particular, we should aspire to match Finland, Canada and Korea.

Focusing on the slope of the regression line (what Willms calls the 'social gradient') provides one perspective on the relationship between social background and educational achievement. It is an indicator of the magnitude of the average differences in educational achievement associated with particular differences in social background.

An alternative is to focus on the correlation (or the squared correlation as a measure of the percentage of variance in achievement accounted for by differences in social background) as an indicator of how well the regression line summarises the relationship for a particular country. On this indicator of equity, Australia appears somewhat better than with the social gradient indicator. It is in the 'high-quality, high-equity

The storyline so far...

There are substantial national benefits in more and better education.

There are substantial individual benefits in completing more education.

Too many young Australians do not finish upper secondary education or its equivalent and the penalties are high.

The quality of education for Australian 15-year-olds

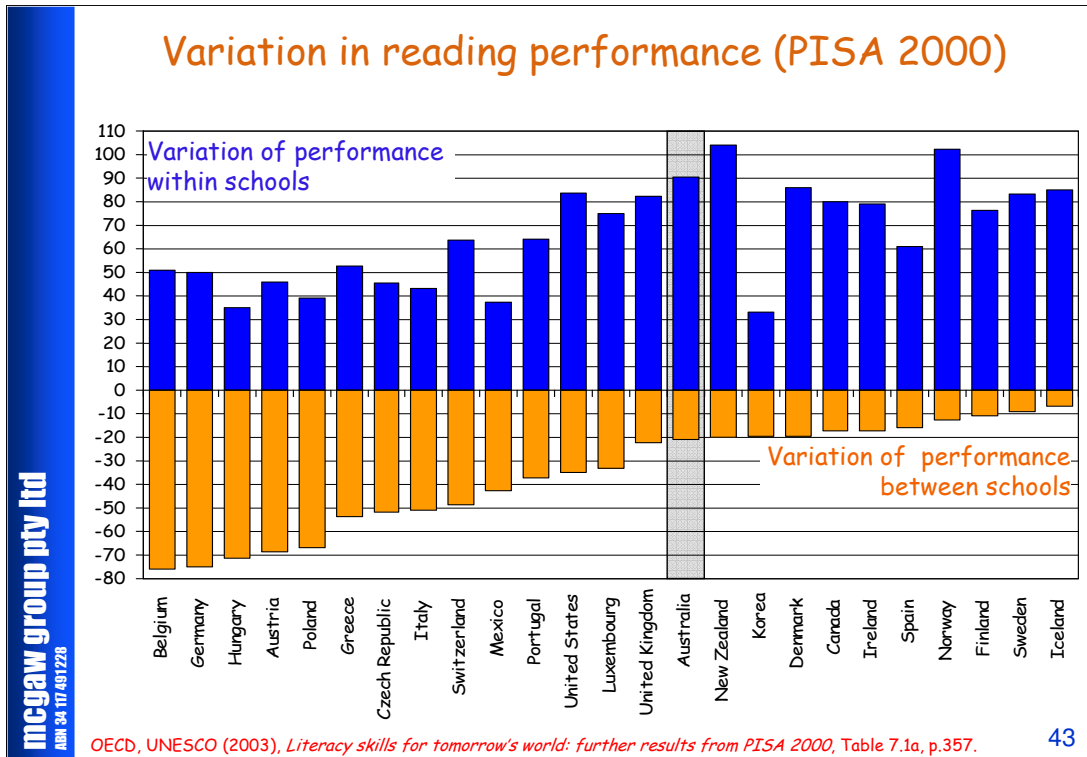
- Is among the best in the world, but we should want gold not silver
- The competition is not standing still

Differences between students in educational performance

- Are no greater for Australia than in other high performing countries
- Are relatively strongly related to differences in social background



Another way in which to examine equity is to investigate the variation in student performance between schools.



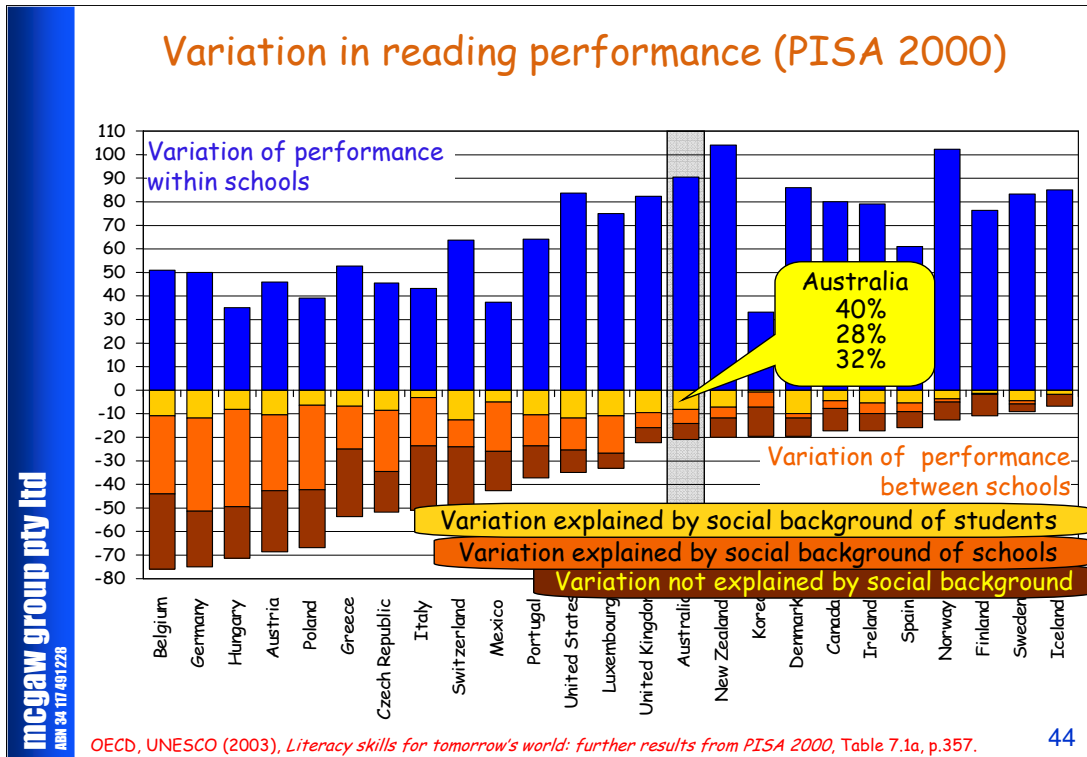
The figure above divides the variation in student performance in reading in PISA 2000 for each country into a component due to differences among students within schools, shown above the zero line, and a component due to differences between schools shown below that line.

In Iceland, Finland and Norway there is very little variation in scores between schools. Choice of school is not very important because there is so little difference among schools.

Among the countries in which there is a large component of variation between schools, there are some in which this occurs by design. In Belgium, Germany and Hungary, for example, students are sorted into schools of different types according to their school performance as early as age 12. The intention is to group similar students within schools differentiated by the extent of academic or vocational emphasis in their curriculum. This is intended to minimise variation within schools in order then to provide the curricula considered most appropriate for the differentiated student groups. It has the consequence of maximising the variation between schools.

In some other countries, the grouping of students is less deliberate but, nevertheless, results in substantial between-school variation. In the United States, for example, 30 per cent of the overall variation is between-schools. In Korea, 37 per cent is between schools. In Australia, 19 per cent is between schools.

For Poland, in PISA 2000, 63 per cent of the variation in reading was between-schools whereas in PISA 2003 in mathematics only 13 per cent was between schools. This remarkable difference was due to a reform in which early streaming of students into schools of different types was abandoned in favour of comprehensive schools for students up to the age at which PISA measures their performance. (Not only was the between-school variation reduced. Poland was the only country to improve its average performance significantly on all measures used in both PISA 2000 and PISA 2003. It did so largely by raising the achievement levels of its poorer performing students.)



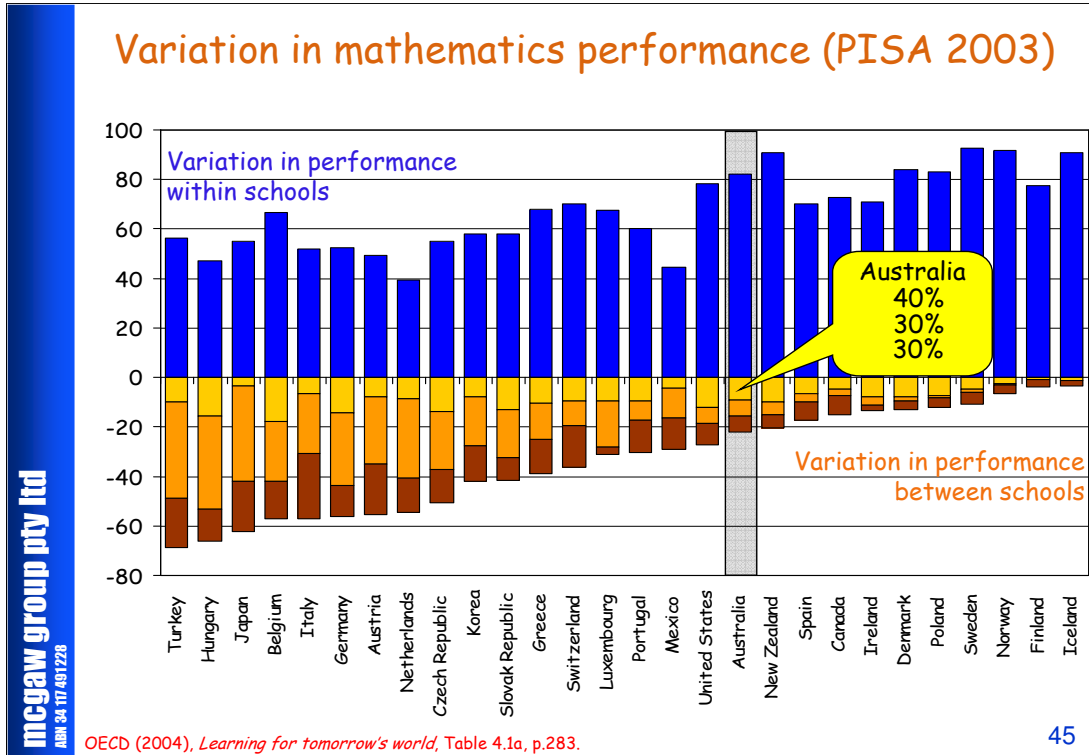
A further way in which to examine equity is to determine the extent to which the variation between schools that can be accounted for in terms of students' social backgrounds can be explained in terms of:

- the social backgrounds of the individual students in the schools
- the average social background of the students in the schools.

The first indicates the impact of students' own social backgrounds, the second the impact of the company they keep in school. In Australia, 68 per cent of the variation between-schools that can be accounted for in terms of differences between schools in the social background of their students splits into 40 per cent due to individual social background and 28 per cent due to the average social background of students in the schools.

Where differences in social background account for a large percentage of the between-school variation, this suggests that the educational arrangements in the country are inequitable. Where much of the account derives from the social background of other students in the school, it suggests that there is a benefit for advantaged students in keeping company with similarly advantaged students but a compounded disadvantage for disadvantaged students keeping company with others like themselves. That suggests a difficult policy conundrum for those who might want different groupings to ameliorate the influence of social background on disadvantaged students because it implies that reduction in disadvantage for them could only be won by a reduction in advantage for the advantaged.

Additional analyses of the PISA 2000 data for Austria, however, offer a more encouraging conclusion. These analyses suggest "that students with lower skills benefit more from being exposed to clever peers, whereas those with higher skills do not seem to be affected much. Social heterogeneity, moreover, has no big adverse effect on academic outcomes. These results imply considerable social gains of reducing stratification in educational settings" (Schneeweis & Winter-Ebmer, Peer effects in Austrian schools. Working Paper No. 0502, Department of Economics, Johannes Kepler University of Linz, Austria 2005, p.2).



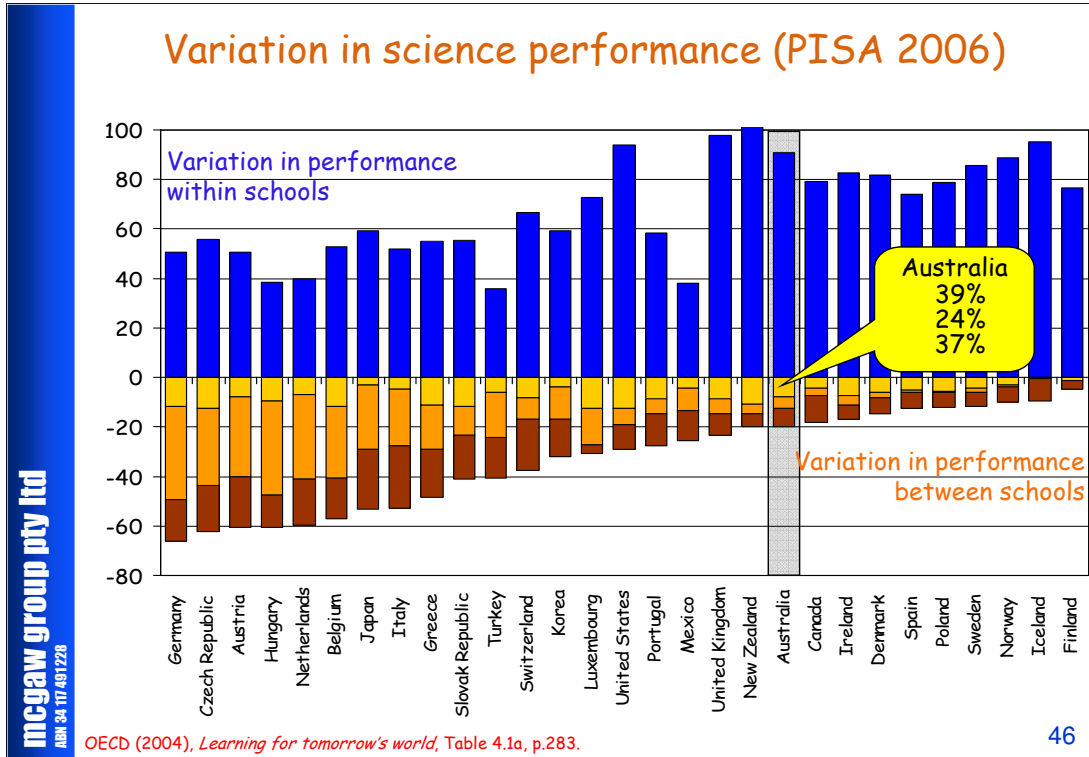
The figure above provides the same analysis as the one in the previous slide but, in this case, for mathematics in PISA 2003. In Australia, 70 per cent of the variation between-schools in mathematics performance can be accounted for in terms of differences between schools in the social background of their students splits into 40 per cent due to individual social background and 30 per cent due to the average social background of students in the schools.

Overall, the pattern is similar to that in the previous slide except for Poland for which:

- in PISA 2000, 63 per cent of the variation in reading was between-schools,
- in PISA 2003, 13 per cent of the variation in mathematics was between schools.

This remarkable difference was due to a reform in which early streaming of students into schools of different types was abandoned in favour of comprehensive schools for students up to the age at which PISA measures their performance. The 15-year-olds in PISA 2000 were under the old system while those in PISA 2003 were under the new system.

More remarkable still, Poland was the only country to improve its average performance significantly on all measures used in both PISA 2000 and PISA 2003 and then to continue this improvement in PISA 2006 in which its results in reading literacy were at the same level as Australia. Poland achieved this first by raising the achievement levels of its poorer performing students and then by raising performance at all levels. Expectations of the weaker students were increased and their performances were improved when they were not consigned to be only with others like themselves.



The figure above provides the same analysis as in the previous two slides but, in this case, for science in PISA 2006. In Australia, 63 per cent of the variation between-schools in science performance can be accounted for in terms of differences between schools in the social background of their students – 39 per cent due to individual social background and 24 per cent due to the average social background of students in the schools.

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The quality of education for Australian 15-year-olds

- Is among the best in the world, but we should want gold not silver
- The competition is not standing still

Differences between students in educational performance

- Are no greater for Australia than in other high performing countries
- Are relatively strongly related to differences in social background

Differences between schools in Australia

- Are relatively large
- Are strongly related to differences in students social backgrounds



Which brings us to the roles of curriculum authorities and schools.

And your responsibilities

- Creating pathways that
 - open appropriate opportunities
 - are separated by relatively permeable boundaries
 - facilitate re-entry
- Others are trying this too but some have problems
 - UK: the A Levels hinder reform
 - European apprenticeship systems
 - Labour market they serve confers advantages
 - Nevertheless, their attractiveness is declining

You have an important role to play in creating the pathways through which students can move in the years beyond compulsory education to complete upper secondary education or its equivalent and, where appropriate, to move on to various forms of tertiary education.

You have an important role in providing the curriculum that will prepare students for university education and the examinations and other forms of assessment that will determine, in part, who gains access to that next level. But you also have an important role in providing other pathways and in keeping the boundaries between all the pathways relatively permeable. To some extent, you can also play a role in facilitating re-entry for students who have dropped out early.

Australia is not alone in seeking to reform and expand its post-compulsory education offerings. The United Kingdom struggles to change its system but is hindered by the need to work around the edges of its A Levels which were created for a small proportion of the population and which are very narrow, allowing students in the final two years of secondary education to study as few as three subjects and for them to be as narrowly focused as, for example, double mathematics and physics.

The stratified academic and vocational systems in European countries with a strong apprenticeship system have often been seen to be an attractive model for Australian attempts to broaden the options available to students in the post-compulsory years of secondary education. It needs to be recognised, however, that the labour market in these European countries confers a considerably higher status on jobs for which the apprenticeships prepare workers and thus on the apprenticeship training than is typically the case in the Australian labour market or in the United Kingdom from which the Australian labour market white-collar/blue-collar structure derives.

I wish you courage and success.

The whole storyline...

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Differences between schools in Australia

- Are relatively large
- Are strongly related to differences in students social backgrounds

Your task is to provide attractive and effective pathways

- To improve completion rates for upper secondary or equivalent
- While ensuring quality of learning

Thank-you

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